

**124. PROFILE ON THE PRODUCTION OF
CARDBOARD**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of cardboard with a capacity of 30,000 tones per annum. Cardboard is a stiff and thick single-ply or multi-ply paperboards that is used in various industries for packaging purposes.

The demand for cardboard is met through both local production and imports. The present (2012) unsatisfied demand for cardboard is estimated at 42,599 tones. The unsatisfied demand for cardboard is projected to reach 68,606 tons and 110,491 tons by the year 2017 and 2022, respectively.

The principal raw materials required are pulp and additives -used to improve the quality of the paperboard both of which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 619.87 million. From the total investment cost the highest share (Birr 471.67 million or 76.03%) is accounted by fixed investment cost followed by initial working capital (Birr 95.07 million or 15.34%) and pre operation cost (Birr 53.51 million or 8.63%). From the total investment cost Birr 336.10 million or 54.22% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 18.94% and a net present value (NPV) of Birr 266.31 million discounted at 10%.

The project can create employment for 45 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with glass wares, soaps and cosmetics, read made garments, shoes, garments, and soda and beverages sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Versatile and light paperboard packages prevent product loss by effectively protecting packed materials against physical damage, contamination and light. Product information can be printed directly onto the surface of the paperboard, so no extra labels are needed. Space-saving designs

are particularly economical in transportation. Efficient logistics reduce fuel consumption and emissions to the atmosphere

More than half of the world's packaging materials are paper and paper board. Paper board is typically made from bleached pulp or unbleached pulp and recycled fiber. Cardboard is a stiff and thick single-ply or multi-ply paperboards that is used in various industries for packaging purposes. Some of these industries that use paper board for packing are glass wares, soaps and cosmetics, read made garments, shoes, garments, and soda and beverages etc. It is also commonly used for cereal boxes, gift boxes, tissue boxes, drink cups etc.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The local demand for cardboard is met through import and local production. The available data on locally manufactured products from Central Statistics Agency (CSA) does not show the production of cardboard to the local market separately. Therefore, the demand for the product is estimated based on the unsatisfied demand i.e. the demand met through import. Accordingly, the quantity of cardboard annually imported during the period 2002-2011 is presented in Table 3.1.

Table 3.1
IMPORTED OF CARD BOARD (TONES)

Year	Quantity
2002	10,220
2003	9,675
2004	17,577
2005	22,909
2006	26,908
2007	30,343
2008	44,374
2009	34,493
2010	31,773
2011	35,171

Source: - Ethiopian Revenues and Customs Authority.

As can be seen from Table 3.1 during the period 2002-2011, import of cardboard though fluctuates from year to year exhibits a highly visible growth. For example the average annual import during the first five years (2002-2006) which was 17,458 tons has increased to an average annual of 35,231 tons during the recent five years (2007-2011) which indicates that the average annual import has more than doubled between the two periods. During the period under consideration (2002-2011) import of cardboard has registered an average annual growth rate of 21.12%.

In order to estimate the present unsatisfied demand for this product, it is assumed the growth rate registered by the product's import during the period 2002-2011 will continue at least in the near future. Accordingly, taking the year 2011 level of import as a base and applying a growth rate of 21.12% the present unsatisfied demand is estimated at 42,599 tones.

2. Projected Demand

The manufacturing sector is the end user of cardboard. Therefore, the demand for the products depends on the performance of the manufacturing sector. According to the government's "Growth and Transformation Plan (2011 – 2015)" during the plan period, the industrial sector is expected to grow at an average annual growth rate of 20%.

However, in order to be conservative a growth rate of 10% which is slightly lower than the expected average annual growth rate of the country's GDP during the GTP period (2011-2015) is used to project the unsatisfied demand for cardboard.

Accordingly, using the estimated present unsatisfied demand as a base and applying a growth rate of 10% the projected unsatisfied demand for cardboard is shown in Table 3.2.

Table 3.2
PROJECTED DEMAND FOR CARDBOARD (TONES)

Year	Demand
2013	46,859
2014	51,545
2015	56,699
2016	62,369
2017	68,606
2018	75,467
2019	83,013
2020	91,315
2021	100,446
2022	110,491

3. Pricing and Distribution

Based on the year 2011, CIF value and subsequent local cost estimates, an ex-factory price of Birr 12 per pcs (550 x 550 x 250 mm) or per 0.650 kg is recommended. Distribution of cardboard by the new entrants in the market shall be handled through direct delivery to customers.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The plant capacity envisaged cardboard production is proposed to be 30,000 tones per year. The plant will operate 300 days per year with 8hrs per day bases.

2. Production Programme

The production program is scheduled in such a way that plant will produce 80% and 90% during the first and second years of production consequently, and will attain its full capacity of production in the third year of operation

IV. MATERIALS AND INPUTS

A. MATERIALS

The main raw material for paperboard plant is pulp and there are additives that are used to improve the quality of the paperboard, almost most of the raw material is imported. The total cost of annual raw material is estimated to be Birr 445.80 million out of which Birr 13.8 million is for additives.

Table 4.1

ANNUAL RAW & AUXILIARIES MATERIALS REQUIRED AND COST

No	Item	Unit of Measure	Qty	Unit Prices	Cost (000 Birr)		
					F.C.	L.C.	Total Cost
1	Kraft Pulp	tone	20,000	15,000	300,000		300,000
2	Additives	tone	10,000	4,600	46,000		46,000
	Sum						346,000

B. UTILITIES

Utilities required by the envisaged plant consist of electricity, water, and fuel oil for steam production. The annual cost of utilities is Birr 38.66 millions which is depicted in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIREMENT

Items	Unit	Unit Cost (Birr)	Quantity	Total Cost
Electricity	kwh	0.58	19,600,000	11,357,500
Water	m ³	10.00	230,000	2,300,000
Fuel Oil	liter	20.00	1,250,000	25,000,000
Total				38,657,500

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The envisaged plant involves production of paperboard from pulp. The production process of paperboard involves the following major steps: Pulp Stock Preparation, Forming, Pressing, Drying, Calendaring, and Reeling/Finishing.

First the Pulp Stock is prepared by diluting the pulp in water by agitating the pulp fiber in a large vessel known as hydropulper and adding required additives to improve the property of paperboard. Once the pulp stock is prepared, the resulting dilute pulp is spread out along a moving belt of wire or plastic mesh by pumping the pulp stock from the headbox. In the forming section, the water content is reduced from 99% in to 80% using natural evaporation and vacuum drying. Then fibers are then pressed for consolidation and to remove any excess moisture through mechanical compression between series of two rolls where the water content of the paperboard is further removed until 60%. After pressing, the pulp is steam-heated using rollers, and additional resin or starch is added as needed. A smooth surface is achieved by coating and calendaring. A series of rollers called a calendar stack is then used to smooth and finish the final paperboard. Finally, the paperboard is reeled up to specified reel diameter for dispatch.

2. Environmental Impact Assessment

The proposed raw material for Cardboard Plant is pulp, processed wood fiber, that will be imported or possibly from local Paper and Pulp Plants of projects currently which will be implemented. The paperboard plant consume significant amount of water and discharge waste water to the environment. The waste water has to be treated properly before discharging it to the environment. The water treatment required is primary treatment with simple flocculation and filtration. The estimated cost waste water treatment plant is Birr 24.60 million.

B. ENGINEERING

1. Machinery and Equipment

The machinery and equipment required for the envisaged plant is used to convert pulp in to paper board. The total cost of machinery and equipment for the envisaged project is Birr 420.125 million out of which Birr 336.10 million is in foreign currency. The machinery and equipment required are shown in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT REQUIRED

No.	Description	Qty
1	Hydra pulper Machine	1
2	Fourdriener	1
3	Pres Machine	1
4	Drier	2
5	Calendaring Machine	
6	Drum reeler	1
7	Rewinder	1

2. Building and civil works

The total land area requirement is 15,000 m² out of which 10,000 m² is built-up area which consists of production hall, water treatment plant, warehouses, offices, boiler house, cafeteria, and guard houses etc. Based on a unit construction rate is Birr 5,000 per m² the cost of building and civil work is estimated at Birr 50 million.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 721/2004) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious

and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%. The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa, the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5000 m², the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m², the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to

Birr 894 per m². The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.

The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m². This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m² (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor price/m²
Central Market District	1 st	1686
	2 nd	1535
	3 rd	1323
	4 th	1085
	5 th	894
Transitional zone	1 st	1035
	2 nd	935
	3 rd	809
	4 th	685
	5 th	555
Expansion zone	1 st	355
	2 nd	299
	3 rd	217
	4 th	191

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones.

Therefore, for the profile a land lease rate of Birr 266 per m² which is equivalent to the average floor price of plots located in expansion zone is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.3 shows incentives for lease payment.

Table 5.3

INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored point	Grace period	Payment Completion Period	Down Payment
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The land lease period for industry is 60 years.

Accordingly, the total land lease cost at a rate of Birr 266 per m² is estimated at Birr 3,990,000 of which 10% or Birr 399,000 will be paid in advance. The remaining Birr 3,591,000 will be paid in equal installments with in 28 years i.e. Birr 128,250 annually.

VI. HUMAN RESOURCES AND TRAINING REQUIREMENT

A. HUMAN RESOURCES REQUIREMENT

The total manpower required for operating the plant will be 45 and the total cost of human resource requirement is Birr 2.00 million. The human resources requirement and the corresponding labor cost are shown in Table 6.1.

Table 6.1

HUMAN RESOURCES REQUIREMENT AND LABOR COSTS

No.	Position Held	No. of Persons	Monthly Salary	Annual Salary
1	Manager	1	10,000.00	120,000.00
2	Secretary	1	3,000.00	36,000.00
3	Administration and Finance Head	1	6,000.00	72,000.00
4	Commercial Head	1	5,000.00	60,000.00
5	Technical Head	1	8,000.00	96,000.00
6	Engineers	3	21,000.00	252,000.00
7	Clerk	1	2,000.00	24,000.00
10	Production supervisor	3	15,000.00	180,000.00
11	Technicians	6	18,000.00	216,000.00
12	Operators	10	25,000.00	300,000.00
13	Assistant operators	10	20,000.00	240,000.00
8	Messenger and Cleaner	4	4,000.00	48,000.00
9	Guard	3	1,500.00	18,000.00
	Employee benefit (25%)			340,500.00
	Total	45	138,500.00	2,002,500.00

B. TRAINING REQUIREMENT

The project requires technical training on special technical know-how on production and machine operation. 3 technical persons will be given on-job training two weeks by the supplier on quality control and production techniques. The estimated required total cost of training is be Birr 150.00 thousands.

VII. FINANCIAL ANALYSIS

The financial analysis of the cardboard project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity & 70% loan
Tax holidays	5 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material imported	120 days
Raw material local	30 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 619.87 million (See Table 7.1). From the total investment cost the highest share (Birr 471.67 million or 76.03%) is accounted by fixed investment cost followed by initial working capital (Birr 95.07

million or 15.34%) and pre operation cost (Birr 53.51 million or 8.63%). From the total investment cost Birr 336.10 million or 54.22% is required in foreign currency.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	Fixed investment				
1.1	Land Lease	399.00		399.00	0.00
1.2	Building and civil work	50,000.00		50,000.00	8.07
1.3	Machinery and equipment	84,025.00	336,100.00	420,125.00	67.78
1.4	Vehicles	900.00		900.00	0.15
1.5	Office furniture and equipment	250.00		250.00	0.04
	Sub total	135,574.00	336,100.00	471,674.00	76.03
2	Pre operating cost *				
2.1	Pre operating cost	12,953.75		12,953.75	2.09
2.2	Interest during construction	40,552.10		40,552.10	6.54
	Sub total	53,505.85		53,505.85	8.63
3	Working capital **	95,073.62		95,073.62	15.34
	Grand Total	283,767.77	336,100.00	619,867.77	100

* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

** *The total working capital required at full capacity operation is Birr 119.58 million. However, only the initial working capital of Birr 95.07 million during the first year of production is assumed to be funded through external sources. During the remaining years the working capital requirement will be financed by funds to be generated internally (for detail working capital requirement see Appendix 7.A.1).*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 527.67million (see Table 7.2). The cost of raw material account for 65.57% of the production cost. The other major components of the production cost are depreciation, financial cost, utility, and repair and

maintenance which account for 16.83%, 7.40%, 7.33% and 2.39% respectively. The remaining 0.48% is the share of marketing and distribution, labour, labour overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (year three)

Items	Cost (000 Birr)	%
Raw Material and Inputs	346,000	65.57
Utilities	38,658	7.33
Maintenance and repair	12,604	2.39
Labour direct	1,662	0.31
Labour overheads	341	0.06
Administration Costs	200	0.04
Land lease cost	0	0.00
Cost of marketing and distribution	350	0.07
Total Operating Costs	399,815	75.77
Depreciation	88,821	16.83
Cost of Finance	39,031	7.40
Total Production Cost	527,667	100.00

C. FINANCIAL EVALUATION

1. Profitability

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 22.20 million to Birr 106.37 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 780.45 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

2. Ratios

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 232,596,000$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 57.78 \%$$

4. Pay-back Period

The pay-back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project’s initial investment will be fully recovered within 6 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 18.94% indicating the viability of the project.

6. Net Present Value

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project in to a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle, a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 10% discount rate is found to be Birr 266.31 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

D. ECONOMIC AND SOCIAL BENEFITS

The project can create employment for 45 persons. The project will generate Birr 231.90 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with glass wares, soaps and cosmetics, read made garments, shoes, garments, and soda and beverages sub sectors and also generates other income for the Government.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.2
PRODUCTION COST (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	276,800	311,400	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000
Utilities	30,926	34,792	38,658	38,658	38,658	38,658	38,658	38,658	38,658	38,658
Maintenance and repair	10,083	11,344	12,604	12,604	12,604	12,604	12,604	12,604	12,604	12,604
Labour direct	1,330	1,496	1,662	1,662	1,662	1,662	1,662	1,662	1,662	1,662
Labour overheads	273	307	341	341	341	341	341	341	341	341
Administration Costs	160	180	200	200	200	200	200	200	200	200
Land lease cost	0	0	0	0	128	128	128	128	128	128
Cost of marketing and distribution	350	350	350	350	350	350	350	350	350	350
Total Operating Costs	319,922	359,869	399,815	399,815	399,819	399,819	399,819	399,819	399,819	399,819
Depreciation	88,821	88,821	88,821	88,821	88,821	2,025	2,025	2,025	2,025	2,025
Cost of Finance	0	44,607	39,031	33,455	27,880	22,304	16,728	11,152	5,576	0
Total Production Cost	408,743	493,297	527,667	522,091	516,520	424,148	418,572	412,996	407,420	401,844

Appendix 7.A.3
INCOME STATEMENT (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	443,040	498,420	553,800	553,800	553,800	553,800	553,800	553,800	553,800	553,800
Less variable costs	319,572	359,519	399,465	399,465	399,465	399,465	399,465	399,465	399,465	399,465
VARIABLE MARGIN	123,468	138,902	154,335	154,335	154,335	154,335	154,335	154,335	154,335	154,335
in % of sales revenue	27.87	27.87	27.87	27.87	27.87	27.87	27.87	27.87	27.87	27.87
Less fixed costs	89,171	89,171	89,171	89,171	89,175	2,379	2,379	2,379	2,379	2,379
OPERATIONAL MARGIN	34,297	49,731	65,164	65,164	65,160	151,956	151,956	151,956	151,956	151,956
in % of sales revenue	7.74	9.98	11.77	11.77	11.77	27.44	27.44	27.44	27.44	27.44
Financial costs		44,607	39,031	33,455	27,880	22,304	16,728	11,152	5,576	0
GROSS PROFIT	34,297	5,123	26,133	31,709	37,280	129,652	135,228	140,804	146,380	151,956
in % of sales revenue	7.74	1.03	4.72	5.73	6.73	23.41	24.42	25.43	26.43	27.44
Income (corporate) tax	0	0	0	9,513	11,184	38,896	40,568	42,241	43,914	45,587
NET PROFIT	34,297	5,123	26,133	22,196	26,096	90,756	94,660	98,563	102,466	106,369
in % of sales revenue	7.74	1.03	4.72	4.01	4.71	16.39	17.09	17.80	18.50	19.21

Appendix 7.A.4**CASH FLOW FOR FINANCIAL MANAGEMENT (in 000 Birr)**

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	484,242	579,617	498,539	553,919	553,800	553,800	553,800	553,800	553,800	553,800	553,800	189,401
Inflow funds	484,242	136,577	119	119	0	0	0	0	0	0	0	0
Inflow operation	0	443,040	498,420	553,800	553,800	553,800	553,800	553,800	553,800	553,800	553,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	189,401
TOTAL CASH OUTFLOW	484,242	456,499	472,234	506,605	498,542	494,643	516,778	512,875	508,971	505,068	445,406	0
Increase in fixed assets	484,242	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	96,025	11,999	11,999	0	0	0	0	0	0	0	0
Operating costs	0	319,572	359,519	399,465	399,465	399,469	399,469	399,469	399,469	399,469	399,469	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income tax	0	0	0	0	9,513	11,184	38,896	40,568	42,241	43,914	45,587	0
Financial costs	0	40,552	44,607	39,031	33,455	27,880	22,304	16,728	11,152	5,576	0	0
Loan repayment	0	0	55,759	55,759	55,759	55,759	55,759	55,759	55,759	55,759	0	0
SURPLUS (DEFICIT)	0	123,118	26,305	47,314	55,258	59,157	37,022	40,925	44,829	48,732	108,394	189,401
CUMULATIVE CASH BALANCE	0	123,118	149,423	196,736	251,994	311,152	348,174	389,099	433,928	482,660	591,054	780,454

Appendix 7.A.5
DISCOUNTED CASH FLOW (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	0	443,040	498,420	553,800	553,800	553,800	553,800	553,800	553,800	553,800	553,800	189,401
Inflow operation	0	443,040	498,420	553,800	553,800	553,800	553,800	553,800	553,800	553,800	553,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	189,401
TOTAL CASH OUTFLOW	579,316	331,803	371,749	399,815	409,328	411,003	438,715	440,388	442,060	443,733	445,406	0
Increase in fixed assets	484,242	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	95,074	11,881	11,881	0	0	0	0	0	0	0	0	0
Operating costs	0	319,572	359,519	399,465	399,465	399,469	399,469	399,469	399,469	399,469	399,469	0
Marketing and Distribution cost	0	350	350	350	350	350	350	350	350	350	350	0
Income (corporate) tax		0	0	0	9,513	11,184	38,896	40,568	42,241	43,914	45,587	0
NET CASH FLOW	-579,316	111,237	126,671	153,985	144,472	142,797	115,085	113,412	111,740	110,067	108,394	189,401
CUMULATIVE NET CASH FLOW	-579,316	468,078	341,407	187,422	-42,950	99,846	214,931	328,344	440,083	550,150	658,544	847,945
Net present value	-579,316	101,125	104,687	115,691	98,676	88,665	64,963	58,198	52,127	46,679	41,791	73,022
Cumulative net present value	-579,316	478,191	373,504	257,813	159,137	-70,471	-5,509	52,690	104,817	151,496	193,287	266,309

NET PRESENT VALUE 266,309
INTERNAL RATE OF RETURN 18.94%
NORMAL PAYBACK 6 years